QUARTZ CRYSTAL MICROBALANCE WITH FEEDBACK LOOP FOR AUTOMATIC GAIN CONTROL

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CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This is a divisional of application No. 09/830,396, which is the national stage entry of PCT/EP99/08148, filed 21 October 1999, now U.S. Patent No. 6,647,764.

FIELD OF THE INVENTION

[0002] This invention generally relates to a novel device, being an analytical apparatus comprising an oscillating piezoelectric sensor and more particularly to an improved quartz crystal microbalance and the use thereof.

BACKGROUND OF THE INVENTION

[0003] A quartz crystal microbalance is a device for detecting and measuring very small changes in mass. Its primary components are a quartz crystal and an oscillator circuit coupled to the quartz crystal to produce an output at a resonant frequency of the crystal. The output frequency, which is typically around 10MHz, is measured to a high degree of accuracy, for example, with a frequency counter. The quartz crystal is, unlike the crystals normally used in electronic circuits, unencapsulated, so that it can interact with its environment. The deposition of small quantities of material onto the crystal changes its resonant frequency and allows the determination of the mass of material deposited. Typically, frequency changes are of the order of a few Hz to a few tens of Hz and changes of the order of nanograms in the mass of material deposited can be detected.